

Solutions

Accept equivalent correct methods and supported interpretations. The marks check reasoning; they are not an official grade.

2.1 A – The conditioning group is the 20 cyclists. B measures the joint share among everyone; C measures the share who cycle, ignoring red clothing.

Correct response linked to the given case.

2.2 A – One event occurring makes the other impossible. B contradicts the zero intersection and positive product of event probabilities; C proposes a condition on totals that does not establish independence.

Correct response linked to the given case.

2.3 0.65 – Complement probabilities sum to 1.

Correct response linked to the given case.

2.4 False – The denominator changes with the conditioning group.

Correct response linked to the given case.

3.1 Total tea drinkers are 21 of 50, so $P(T) = 21/50$. Within cyclists, $P(T | C) = 12/20 = 3/5$. Within tea drinkers, $P(C | T) = 12/21 = 4/7$. These different denominators make the conditional probabilities unequal.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence
. Accurate conditions, checks or qualification.

3.2 They are not independent because $P(T | C) = 3/5 \neq 21/50 = P(T)$. They are not disjoint because 12 respondents do both: $P(T \cap C) = 12/50 > 0$.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence.
Accurate conditions, checks or qualification.

3.3 Use inclusion–exclusion. $P(W \cup T) = (30 + 21 - 9)/50 = 42/50 = 21/25$. The 9 tea-drinking walkers must not be counted twice. Equivalently exclude the 8 cyclists who do not drink tea.

Sound conclusion or proposed method. Relevant supporting steps or textual evidence.
Accurate conditions, checks or qualification.